The Health Effects of Video Games in Children and Adolescents

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PRACTICE/EDUCATION GAPS

During the past several decades, video games have played an ever-larger role in the lives of children; however, quality research on the health effects of video game use has lagged. Recent high-quality studies have refined our understanding of this association. Clinicians should have a basic understanding of the effects of video game use on the health of children and adolescents and should be able to guide patients and caregivers on appropriate use. With the recent addition of gaming disorder to the *International Classification of Diseases, 11th Revision,* clinicians should know how to identify and screen for pathologic gaming.

OBJECTIVES *After completing this article, readers should be able to:*

1. Identify the major benefits and risks of video game use on child health and development.
2. List the symptoms of the *International Classification of Diseases, 11th Revision*'s newly added gaming disorder and distinguish between healthy and pathologic gaming.
3. Gain comfort in addressing the role that video games play on physical, cognitive, mental, and social health when engaging with patients and their caregivers.

ABSTRACT

Play has always been an essential part of childhood, but it looks different for modern children, who increasingly engage in virtual play. More than 90% of children older than 2 years play video games, and three-quarters of American households own a video game console. Children 8 to 17 years of age spend an average of 1.5 to 2 hours daily playing video games. Recent developments framed by decades of research have provided insight into how games influence children's physical health, mental health, social behaviors, and cognitive development. Anticipatory guidance surrounding media use is often centered on screen time, but pediatricians should have some knowledge of the unique benefits and risks associated with this nearly ubiquitous activity. In light of the recent addition of gaming disorder

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ABBREVIATIONS

AAP	American Academy of Pediatrics
ADHD	attention-deficit/hyperactivity disorder
APA	American Psychological Association
ESRB	Entertainment Software Rating Board
GADIS	Gaming Disorder Scale
ICD-11	*International Classification of Diseases, 11th Revision*
IGDT-10	Ten-Item Internet Gaming Disorder Test

to the *International Classification of Diseases, 11th Revision*, this review includes a discussion of the epidemiology, clinical features, and diagnosis of gaming disorder, including the use of existing screening tools. As games become more popular while ever-increasing in scope and complexity, this review aims to educate the modern pediatric provider about what is known, what is uncertain, and how to use this knowledge in the management of both healthy and unhealthy video gaming in children.

INTRODUCTION

During the past few decades, video games have become a favorite pastime for many children, and their use continues to increase. (1) The percentage of American children who play video games is estimated to be more than 90%, increasing to 97% among those ages 12 to 17 years. (2) In 2021, the average 8- to 12-year-old played approximately 1.5 hours of video games daily, and the average 13- to 17-year-old played for almost 2 hours. (3) Video games occupy a significant portion of children's days, making them a potential driver of child health and development in both positive and negative ways. As researchers find new connections between gameplay and well-being, it is important for pediatricians to have some familiarity with the effects of this almost-ubiquitous activity. Several articles in the past few years have reviewed the literature surrounding screen time and social media use in children. (4)(5)(6) This review summarizes the expansive topic of childhood video game use and its unique implications for health and development with the purpose of pediatrician education. Some facets of this topic are politicized and highly debated, with parents, researchers, game producers, and policy makers having different, sometimes competing, opinions. (7) However, high-quality research during the past decade has clarified our understanding of some of these effects. Note that most research in children has focused on adolescents, with less robust literature on preadolescents. In addition, some of the research discussed in this article was performed in adults and is discussed if relevant in the absence of reliable studies in children.

THE IMPACT OF VIDEO GAMES ON PHYSICAL HEALTH

Researchers have long known about the adverse effects that screen time can have on child and adolescent health. The relationship between excessive screen time and obesity itself is well-documented. (8) Spending time in front of screens has the potential to increase BMI by several mechanisms, including increased sedentary time, increased snacking and decreased satiety cues, disrupted sleep, and exposure to food marketing. (9) Although the data on media use such as television and video viewing is clear, data are more mixed for video games. A 2020 review found 26 articles concerning the association between video games and obesity. (10) The authors concluded that there was inconsistent evidence of the relationship between video games and obesity, with 14 articles finding no association and 12 articles finding a positive association between video game use and weight gain. Compared with resting in a sitting position, gaming increases heart rate, blood pressure, and overall caloric expenditure. (11) However, this is likely mitigated by findings in several studies that video gamers consume more snacks, more fatty foods, and more sugary beverages than nongamers. (11)(12)(13) Gamers are exposed to less food and product promotion than traditional media, although mobile phone and tablet games frequently contain advertisements. Overall, the association between playing video games and obesity is less clear than for more passive media use such as television viewing, but the net effect is likely a slight tendency toward weight gain and unhealthy eating.

This does not include newer physically active games, or "exergames," which have shown promise in promoting a range of healthier behaviors. (10) One example most people have heard of is *Pokémon Go*, a game that relies on the player's movement through the real world via walking or running to progress. By coupling exercise (something children should do) with an appealing activity such as achievement in a video game (something children want to do), enjoyment of the less-preferable activity is increased. As of 2019, players of *Pokémon Go* had walked an astounding 14 billion miles catching and hatching the small animated creatures known as Pokémon. (14) A 2021 systematic review found that playing *Pokémon Go* had measurable positive effects on physical, mental, and social health. (15) There are many exergames now available, from *Pokémon Go* to the ever-popular *Dance Dance Revolution* series to newer, accessible virtual reality systems; all have the potential to increase activity in previously sedentary patients. When used regularly, exergames have been shown to have beneficial effects for weight loss, exercise program adherence, and even depression. (16)(17)(18)

It is also known that the use of screens close to bedtime decreases both quantity and quality of sleep. Playing video games in the evening is associated with longer time to fall asleep, decreased total sleep, and architectural changes in rapid eye movement and slow-wave sleep in children. There may also be an association between playing games in the evening and next-day attention and memory. These effects may be mediated by several mechanisms, including disruption of normal melatonin secretion due to light exposure, psychomotor stimulation by more exciting games, or displacement of sleep by gameplay. (19)(20)(21)(22) Several small studies have found that playing fast-paced, violent games and playing for a prolonged period (>2.5 hours) are associated with significant disruptions in sleep compared with shorter, more relaxed gameplay. (23)(24) Sleep deprivation has been associated with a multitude of undesirable health effects, including decreased executive functioning skills and academic performance, irritability and mood disorders, and physical inactivity. (25) Having a screen in the child's bedroom, in addition to effects on sleep, decreases parents' ability to monitor gaming activities and has been shown independently to be linked to obesity and to decreased academic performance. (26)(27)

THE IMPACT OF VIDEO GAMES ON COGNITIVE DEVELOPMENT

Physical play has distinct advantages over virtual play, including the development of fine and gross motor skills and reduced screen time. Young children show deficits in learning from screens compared with direct interaction with other humans. (28) The dangers of excess media use in young children are well-known, and the benefits of hands-on play cannot be understated. (4)

Not all screen time is equal, and the active attention and participation asked of the player make video games more cognitively stimulating than television watching. Virtual play cannot replace physical play, although there is some value in solving puzzles and overcoming obstacles even through a screen. There is experimental evidence in older children and adolescents that consistent video gameplay can enhance a variety of cognitive domains, including problem solving, working memory, information processing, and flexibility. (29) Action games may improve visual processing and reaction times. (30)(31)(32) Puzzle games, memory games, and strategy games may improve other aspects of executive functioning. (33)(34)(35) Much like playing a sport, playing video games strengthens connections through repetition. There is evidence that some of these skills transfer to the real world, as a small study found that training with action games improved reading abilities in children with dyslexia. (36)

The ability of games to promote cognitive development depends on the context of the gaming and the age of the child. Many principles from the American Academy of Pediatrics' (AAP's) Media and Young Minds 2016 policy statement can be applied to video game use. (4) Parents should monitor children's gaming activities, keep video games away from eating and sleeping spaces, and avoid fast-paced and violent games in young children. When possible, games should be enjoyed together to promote learning. For example, open-ended games such as *Minecraft* and *Roblox* are great for encouraging creativity, but as with physical play, learners may derive the greatest benefit when co-playing with an adult who can provide direction, context, and opportunity for socialization. The most recent screen time guidelines from the AAP recommend against most screen use for children younger than 2 years; this should apply to video games as well. Children between 3 and 5 years of age should be limited to 1 hour per day of media use, including video games.

Limit setting is important for school-age children and adolescents as well, and more liberal gameplay time must be balanced with other essential needs. Families should create and consistently follow plans for video game use that ensure adequate sleep (8–12 hours nightly depending on age), physical activity (1 hour daily), time for schoolwork, and in-person interaction with family and friends. (37) Sensible limits on gaming may be different between children depending on their ability to meet these needs.

The relationship between video game use and attention problems has been much studied. A 2018 systematic review found a statistically small relationship between screen media use and attention-deficit/hyperactivity disorder (ADHD)–related behaviors. (38) This association is theorized to be stronger for video games than traditional media due to higher levels of engagement and arousal. Most studies have been cross-sectional, making causation difficult to establish. A recent longitudinal study did find that video game use predicted ADHD symptoms in adolescents, but existing ADHD symptoms did not predict future video game use, suggesting a causal link. (39) Children with ADHD are also more likely to use video games excessively, with longer play times on average and more addictive behavior. (40)(41) Therefore, children with ADHD and their guardians may benefit from education about appropriate play, particularly limit setting to ensure that video games do not interfere with other necessary activities.

THE IMPACT OF VIDEO GAMES ON MENTAL HEALTH

The link between gaming and mental health is complex. The overall effect on emotional well-being seems to be related to many factors, including time spent gaming, motivations for gaming, and whether gaming is done alone or socially. Many studies have found associations between excessive gameplay and negative psychosocial outcomes. (42) "Excessive play" is used generally to represent a state of addiction that affects other aspects of a player's life, which will be discussed more later. People who engage in moderate video game use have improved affective symptoms compared with those who play video games excessively or not at all. (43)(44) One study in college-age men found that they played more video games when stressed, lonely, or bored, without significant effects on BMI or grade point average, suggesting a healthy means of socialization and relaxation. (45) A variety of commercial video games have shown efficacy in reducing stress and anxiety in both adolescents and young adults, even with brief play sessions. (46) In 1 study, gamers cited feelings of stress relief, reduced anxiety, and a "sense of purpose" from accomplishment in games. (1) In addition to the amount of gameplay, motivations for gameplay are important. Playing for enjoyment or for social purposes improves psychological symptoms compared with playing purely for escapism or achievement. (47) Overall, playing video games can have positive effects on children's mental health, but they must be enjoyed in a healthy way. This is to say that one must consider not only the amount of time spent playing but also why they are playing the game and whether they are truly enjoying their experience.

Video games also offer a way for children to explore new identities. For example, a child assigned a certain gender at birth can play a video game as a character with a different gender expression. They can then explore this identity in an environment that they may consider safer. Some games even offer romantic relationships with characters of the same sex, which can offer a unique opportunity to LGBTQ adolescents who may not be ready or able to express their sexuality in the real world.

The potential for negative psychological effects must be considered as well. A central question of gaming research during the past 4 decades has been whether violent video games can make children more aggressive. This issue is often at the forefront of media and policy maker discussions about video games, and it came to a head in the late 1990s and early 2000s after a string of mass shootings and the popularity of the *Grand Theft Auto* series, with the first title being banned in Britain, Germany, and France due to its "extreme violence." A violent game is one that allows players to kill or inflict serious harm against human or humanlike characters. This definition is broad and applies to games depicting intense violence, blood, and gore such as the *Grand Theft Auto* and *Call of Duty* series. (48) It can also apply to more child-friendly games such as *Minecraft*, which has a content warning for "fantasy violence," and *Fortnite*, which contains violence but not blood and gore. Video-game content warnings and age ratings will be discussed more later herein.

Several meta-analyses have found a significant relationship between violence in video games and aggressive behavior in players. (49)(50) In their 2020 updated resolution on the topic, the American Psychological Association (APA) does recognize a link between violent video games and increased aggression (using insults, making threats, yelling, pushing), decreased sensitization, and decreased empathy but not actual violence or criminal behavior. (51) This report has come under criticism from some experts. One 3-year-long longitudinal study found that violent video games had no effect on aggression when controlling for other factors, such as depression, exposure to family and peer violence, and antisocial personality traits. (52) There are concerns about publication bias; more recent studies with preregistered hypotheses have found weaker associations between violent video games and aggressive behavior than previous work. Despite the controversy, the APA maintains that this association has been shown consistently over time. The style of game seems to matter, as self-reports of aggression have been shown in several studies to be lower when playing video games with social aspects such as multiplayer games with cooperative play. (53)(54) Postgame aggression may also be influenced by the context in which the violence occurs, as players enacting violence through a moral character (against "bad" people) experienced lower levels of aggression than players enacting violence through an immoral character (against "good" or "innocent" people). (55)(56) More quality studies are needed to further explore this relationship. Enough evidence exists to suggest that playing violent video games can contribute to aggression, but the APA resolution states that "attributing violence to violent video gaming is not scientifically sound and draws attention away from other factors [which contribute to violence]."

Video games also have a strong potential for addiction. For many, they offer a tempting escape from real life, along with engaging design and satisfying reward systems. Problems arise when players game excessively and compulsively. Proposed symptoms of gaming disorder (or Internet gaming disorder) lean heavily on criteria for substance use disorder and include a preoccupation with games, mood symptoms such as irritability and sadness when the game is taken away (withdrawal), increasing amounts of time spent gaming (tolerance), and unsuccessful attempts to quit. (57) The *International Classification of Diseases, 11th Revision* (*ICD-11*), which is published by the World Health Organization and took effect on January 1, 2022, includes gaming disorder for the first time, and the *Diagnostic and Statistical Manual* *of Mental Disorders, Fifth Edition* (published by the APA in 2013) includes Internet gaming disorder simply as a “condition for further study.” (58) The *ICD-11* requires “marked distress or significant impairment in personal, family, social, educational or occupational functioning” for gaming disorder to be diagnosed. Gaming disorder is a type of behavioral addiction and can be compared clinically to gambling disorder. There remains a lack of consensus on the assessment and symptoms of problematic gaming, making prevalence estimates difficult. (59) A recent study of more than 100,000 gamers found that approximtely 2% had disordered gaming behavior when assessed with the new World Health Organization framework. (60) The best estimates of prevalence among adolescents are even higher at 3.3% to 4.6%, with boys affected at a rate of 5:1 compared with girls. (61)(62) Problematic gaming behavior is more prevalent in male adolescents and those with ADHD, and other coexisting disorders such as depression and anxiety should be considered. (40)(63)(64)

Providers should be aware of gaming disorder as an entity, and at the same time should be thoughtful about assigning the diagnosis and referring to treatment. False-positive cases in healthy gamers can cause tensions in the parent-child relationship, inappropriate treatment, and stigma. The association between time spent gaming and severity of disordered gaming behavior is not perfectly linear, and someone who plays for 30 hours per week may have a healthier relationship with video games than someone who plays for 20 hours per week. (60) Patients meeting the criteria for gaming disorder play for an average of 35 to 40 hours per week. Treatment centers have been established in some East Asian countries, (65) but at this time patients in the United States should be referred to cognitive behavioral therapy or family therapy services with the understanding that there is a lack of randomized controlled research concerning the efficacy of treatment options. (66)(67) In-office strategies such as motivational interviewing and Screening, Brief Intervention, and Referral to Treatment may also be used. There currently exist several screening tools for gaming disorder that have been validated in preliminary studies, examples of which are the Ten-Item Internet Gaming Disorder Test (IGDT-10) and the Gaming Disorder Scale (GADIS), with versions for adolescents and for parents. (68)(69)(70) The IGDT-10 is based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition framework, and the GADIS is based on the *ICD-11* framework. The IGDT-10 can be administered more rapidly and has a simpler scoring system. Advantages of the GADIS include a stronger emphasis on negative consequences and availability of a caregiver questionnaire for patients who may have unreliable self-ratings. A version of the GADIS was also developed specifically for adolescents (ages 10–17 years). Both are screening tools and should be used in conjunction with clinical interviews for diagnosis. The questions contained in the English versions of both tools can be found in Tables 1 and 2.

THE IMPACT OF VIDEO GAMES ON SOCIAL HEALTH

In our increasingly digital, globalized world we rely on technology to stay close to people. This shift has accelerated during the past 2 years during the coronavirus disease 2019 pandemic, with more people using social media and online video games to communicate with friends and family. (1) Many children use video games as a tool to build and maintain relationships with their peers. A 2021 online poll found that more than half of teens prefer video games as a way to keep in touch with friends over video calling or social media. (71) Cooperating in a game environment to achieve

Table 1. Ten-Item Internet Gaming Disorder Test

In the past 12 months:

1. When you were not playing, how often have you fantasized about gaming, thought of previous gaming sessions, and/or anticipated the next game?
2. How often have you felt restless, irritable, anxious, and/or sad when you were unable to play or played less than usual?
3. Have you ever felt the need to play more often or played for longer periods to feel that you have played enough?
4. Have you ever unsuccessfully tried to reduce the time spent on gaming?
5. Have you ever played games rather than meet your friends or participate in hobbies and pastimes that you used to enjoy before?
6. Have you played a lot despite negative consequences (eg, losing sleep, not being able to do well in school or work, having arguments with your family or friends, and/or neglecting important duties)?
7. Have you tried to keep your family, friends, or other important people from knowing how much you were gaming or have you lied to them regarding your gaming?
8. Have you played to relieve a negative mood (eg, helplessness, guilt, or anxiety)?
9. Have you risked or lost a significant relationship because of gaming?
10. Have you ever jeopardized your school or work performance because of gaming?

Answer choices include never, sometimes, or often. If at least 5 criteria are met (with answers of “often”), the screen is considered positive. Of note, items 9 and 10 belong to the same criterion, and a positive response on either or both counts as 1 criterion met.
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Table 2. Gaming Disorder Scale for Adolescents

In the past 12 months:

1. I often play games more frequently and longer than I planned to or agreed upon with my parents.
2. I often cannot stop gaming even though it would be sensible to do so or, for example, my parents have told me to stop.
3. I often do not pursue interests outside the digital world because I prefer gaming. For example, I do not meet with friends/my partner in real life, do not attend sports clubs/societies, do not read books or make music because of gaming.
4. I neglect daily duties, because I prefer gaming. Daily duties include, for example, doing grocery shopping, cleaning, tidying up after myself, tidying up my room, fulfilling obligations for school/apprenticeship/job.
5. I continue gaming even though it causes me stress with others. This means, for example, stress with my parents, siblings, friends, partner, or teachers because of gaming.
6. I continue gaming although it harms my performance at school (or apprenticeship/job). For example, I'm late, I do not participate in class, I neglect homework, and I get worse grades because of gaming.
7. Due to gaming, I neglect my appearance, personal hygiene, and/or my health. For instance, I sleep less, eat unhealthy, and/or exercise less because of gaming.
8. Due to gaming, I risk losing important contacts or have lost them already. This includes contacts with partners, friends, acquaintances, or family.
9. Due to gaming, I have disadvantages at school/apprenticeship/job. For example, I got bad (final) grades, I'm unable to continue to next grade or do not graduate, I have no place for training or studying, and/or I got a poor reference or a warning/dismissal as a result of gaming.
10. In the past year, how often did you experience the conflicts or difficulties described in the statements 1 to 9 due to gaming? (not at all, single days, longer periods, or almost daily)
    Original scale includes 3 additional questions further clarifying item 10

Items 1 through 9 are Likert-type responses ranging from strongly disagree to strongly agree. If positive for both cognitive behavioral symptoms (items 1, 2, 4, and 5) and negative consequences (items 3, 6, 7, 8, and 9) and the time criterion is met (item 10), then the screen is indicative of gaming disorder.

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objectives can be more stimulating than other forms of online socialization. In the *Journal of Cyberpsychology, Behavior, and Social Networking*, psychologist Brenda Wiederhold compared this "virtual meeting place" to a mall or a playground during prepandemic times. (72) As more traditional types of in-person play became less feasible, children engaged in more social gaming with friends and family to fill the gap. Online video games provide an accessible tool that can help children meet their social needs. Playing video games with friends may be a normal part of social development for today's children, just as playing tag on the playground was for previous generations.

Compared with playing alone, being socially active in games has been associated with lower levels of depression and addiction even in those who play heavily. (63) Other benefits include increased prosocial behaviors such as cooperation and empathy, and decreased aggression after playing violent video games with social components. (53)(73)(74)(75) There are clear benefits to playing with others, and cooperative play (working with others toward a common objective) has emotional and social advantages over competitive play (trying to defeat others). (76) There is no strong evidence that certain levels of gaming negatively affect family closeness, activity involvement, or school engagement. (44) However, online games should not completely replace in-person interaction; 1 study found that social connections were strongest when friends had both online and offline interaction. (77) Families can also benefit from playing video games together. Parents who take an active interest in their child's gaming have more opportunities for co-play, which has known social and developmental benefits over playing alone. (78)

Social gaming exists in many forms. It can be 2 people playing together in the same room, which is known as "couch co-op," or it can be 2 people far from each other who have never met. Social video games can also serve more specific roles. Cooperation in games can help build social behaviors that may be difficult to develop for some children in real life, such as those with autism spectrum disorder, social anxiety, or other socialization disorders/avoidant behaviors. People who have trouble finding friends in real life can find others with shared interest in a game.

Types of social video games and popular examples are as follows:

- Cooperative games (playing with others): *Minecraft, Animal Crossing, Stardew Valley, Farming Simulator* series, *Lego* series, *Overcooked* series, *Cuphead*
- Competitive games (playing against others): *Super Smash Bros.* series, *Mario Kart* series, *Mario Party* series, *Wii Sports, Fall Guys, Rec Room*
- Cooperative and competitive elements (can play with others and against others): *Roblox, Rocket League, Among*

Us, Pokémon series, Fortnite, Overwatch*, League of Legends*, Sea of Thieves*, Valorant*, Apex Legends*, Call of Duty* series*, *Halo* series*
- Massive multiplayer online role-playing games (cooperative and competitive elements): *MapleStory, Wizard101, World of Warcraft*, RuneScape*, Sea of Thieves*, The Elder Scrolls Online**
- Socialization/chat games: *VRChat*, Second Life*, Avakin Life**

*These games contain content that may not be appropriate for children younger than 13 years.

CYBERBULLYING IN VIDEO GAMES

Online experiences with other real players do have the potential for more harmful interactions. Although traditionally more of an issue on social media platforms, cyberbullying also exists in online video games. According to the Centers for Disease Control and Prevention (CDC), more than 15% of high school students report being bullied online in the past year, and cyberbullying (similar to traditional bullying) can have negative psychological and social effects. (79)(80) Cyberbullying has been associated with higher rates of depression and suicidality, social isolation, and difficulty trusting peers. Bullying in online games takes several forms: exclusion from playing with others, targeting a single player and intentionally causing them to lose the game, and verbal harassment, which can range from generally offensive language to personal attacks to bigoted slurs targeting sexuality, race, or gender.

Cyberbullying in games can come from people the victim knows or does not know in real life, can be completely anonymous due to aliases, can occur at any time of day, and can invade safe spaces at home that in-person bullying cannot. Certain video games are infamous for having a "toxic" player community; that is, one that is more exclusionary and less friendly, and other games have friendlier communities. (81) In addition to cyberbullying, online multiplayer games have the potential to expose children to strangers with malicious intent who could exploit younger players sexually or financially.

The 2011 AAP report on "The Impact of Social Media on Children, Adolescents, and Families" provides recommendations around Internet safety and cyberbullying. Several actions are recommended for pediatricians, including encouraging parents to talk with their children about online use and active participation in monitoring their child's online activities. Parents should know who their children are playing with, and children should be educated about online safety, including what bullying looks like. Cyberbullying in online games is harder to track than on social media because there is often no record of conversations or of in-game activities. Parents with children younger than 13 years should be more vigilant, including keeping gaming devices in family areas and encouraging children to play without headphones. Older adolescents may want more privacy while gaming with peers, but parents should engage them in regular conversation about their experiences. Many online games have processes for reporting and banning players who engage in inappropriate behavior. Certain kinds of behavior should be reported to the child's school or to the authorities in the case of criminal behavior.

HOW PARENTS CAN MAKE GAMES SAFER

As discussed, it is beneficial for parents to take an interested and active role in their child's video gaming because this can strengthen family connections, enrich learning, and make games safer. It is also important because children, particularly preadolescents, lack the ability to contextualize mature gaming content. Games may include violence, strong language, or suggestive themes such as substance use, gambling, and sexual content. Younger children may have trouble enjoying these games in a safe way, leading to problems with personal development and socialization. (82) In addition to these adult themes, female representation in video games remains a problem. As is the case with media in general, female characters in games are frequently subject to subordination to male characters, objectification, and hypersexualization. With repeated exposure, this can lead to sexist beliefs in men and low self-efficacy and self-objectification in women. (83) A caregiver can help by being present while the child plays to give context about fictitious depictions compared with real-life social expectations, and the importance of respect and consent.

In addition to this more active role, there exist tools to help parents make informed decisions about which games their children are exposed to. The Entertainment Software Rating Board (ESRB) is a self-regulatory organization established by the video game industry in 1994 to assign content ratings to all consumer video games in the United States. The 3-part rating system informs parents about age-appropriateness, specific content warnings, and interactive elements such as communication with others online, sharing location data, or in-game purchases. (48) The ESRB has several ratings: E (everyone), all ages; E 10+ (everyone 10+), everyone older than 10 years; T (teen), everyone older than 13 years; M (mature), everyone older than 17 years; and Ao (adults only), everyone older than 18 years.

This is the most widely used rating system for commercially available games, and parents should be aware of this system and how to use it. However, independent game creators do not necessarily need to have a rating assigned to their game to sell it, particularly on mobile phone and tablet platforms, so awareness of game content is still important. Most gaming devices now come with parental control features, and even those with cursory knowledge of technology can set restrictions on mature content, unauthorized purchases, and the ability to communicate online with others. In addition to official rating bodies such as the ESRB, websites such as commonsensemedia.org and askaboutgames.com offer parent-focused reviews and ratings to help in determining appropriateness.

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Summary

- Video games have become a major part of many children's lives, and their use has significant effects on various aspects of health and well-being. They can be a normal part of modern childhood development and recreation when used in a healthy way.
- Providers and parents should use recommendations from the American Academy of Pediatrics concerning media use, such as setting consistent limits based on the child's age and ensuring that gaming does not interfere with adequate physical activity, sleep, and other behaviors essential to health (https://www.aap.org/en/patient-care/media-and-children/policies-on-children-and-media and healthychildren.org).
- Based on some research evidence, playing video games is a risk factor for obesity. Based on some research evidence, physically active video games (exergames) can be an effective weight loss tool for some patients.
- Based on some research evidence, playing video games in the evening reduces sleep quality and quantity. Providers should stress the importance of playing early and of removing screens from bedrooms.
- Based on some research evidence, video games can reduce anxiety and stress when enjoyed in moderation. In addition, playing with others provides mental health benefits compared with playing games alone.
- Based on some research evidence and consensus, violent video games should be considered a risk factor for increased aggressive behavior. However, the effect is likely influenced by other risk factors for aggression, and no clear link with actual violence has been demonstrated.
- Based on some research evidence and consensus, gaming disorder is a discrete diagnosis added to the *International Classification of Diseases, 11th Revision* describing addictive behavior around video game use. Providers should be able to identify potentially problematic gaming, which shares features with substance use disorders (preoccupation, withdrawal, tolerance, etc). Male adolescents and those with attention-deficit/hyperactivity disorder are at increased risk. Formal screening with a validated screening tool and referral to cognitive behavioral therapy are potential next steps.
- Online multiplayer games can expose children to cyberbullying, which can have adverse effects on mental health, and to strangers with unknown intent. Parents should know who their child is interacting with online and should educate their children about online citizenship and safety.
- Providers should encourage parents to look at Entertainment Software Rating Board ratings or a similar rating system before purchasing video games for their children to determine whether the game is age- and content-appropriate. Co-play with caregivers should be encouraged because it can strengthen family connections, make games safer, and help children derive the greatest developmental benefits from their play.

References and teaching slides for this article can be found at https://doi.org/10.1542/pir.2022-005666.

PIR QUIZ

1. A 10-year-old boy is seen in the clinic for a health maintenance visit. His parents note that he is having more trouble concentrating in the classroom. He is very tired after school and has trouble completing his homework. He plays video games in his bedroom at night and tells his parents that he does this to relax after a long day at school. The physician is most likely to inform the parents that playing video games at night is associated with which of the following?
   - A. Better attention skills at school.
   - B. Better memory skills.
   - C. Longer sleep duration.
   - D. Longer time to fall asleep.
   - E. No change in rapid eye movement and slow-wave sleep architecture.
2. In a meeting with the billing and coding team of your clinic, they note that you have been using a diagnosis of Internet gaming disorder in your documentation recently. They ask for more information on this diagnosis to support your billing and coding as they are not aware of this condition and wonder whether it is better described under another condition. You are most likely to provide which of the following clarifications?
   - A. Coding for this condition can be disregarded.
   - B. The *International Classification of Diseases, 11th Revision* includes gaming disorder as a diagnosis.
   - C. Internet gaming disorder is a confirmed *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* diagnosis.
   - D. Gaming disorder is an accepted lay diagnosis.
   - E. This diagnosis can be considered to be obsessive-compulsive disorder.
3. A 15-year-old boy is brought to the clinic by his parents. The patient reports that he stays awake all night playing multiplayer games with gamers from around the world. He has made small amounts of money from his participation in some of these activities and has stopped attending school consistently. His parents seek your guidance. You are most likely to provide which of the following recommendations?
   - A. Make a referral for cognitive behavioral therapy.
   - B. Make him use his earnings to pay for Internet services at home.
   - C. The family should support his efforts as a future career option.
   - D. Transition him to a group home setting for treatment of gaming addiction.
   - E. Transition him to an online educational program.

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4. A 16-year-old boy is seen in your clinic. He is part of a family you have known for a long time, and you also follow 3 of this boy's younger siblings. The parents note that he is doing well in school, but they worry that he spends too much time online playing multiplayer games. Both of his parents play online games at times, and they are concerned that they have set a bad example for their son. Which of the following is the most appropriate response to the parents' concerns?

   A. Parents should stop all online gaming for themselves.
   B. Require the 16-year-old to earn his gaming time by babysitting his younger siblings.
   C. Require the 16-year-old to engage a younger sibling in his gaming.
   D. Restrict the 16-year-old to games that are not multiplayer.
   E. Transition gaming to a family activity that they share.

5. A 14-year-old girl is brought to the clinic by her parents with concerns of depression. She is wearing a hoodie that she declines to remove. The physician notes healed scars on her arms from self-injury. She denies suicidal or self-harm concerns today. Her mother shares that the girl has been bullied online in virtual forums and that she is slowly recovering from these experiences. The girl and her mother both deny in-person bullying at school or in her community activities. Which of the following is the most appropriate first step in management?

   A. Admit her for an inpatient psychiatric evaluation.
   B. Encourage parents to talk with her about online use.
   C. Request an Individualized Educational Plan for educational support.
   D. Stop all online activity.
   E. Transition her to an online educational monitored setting.